

REMARKS

Claims 1-20 are pending in the application. Claims 1 and 8-11 have been amended and claims 15-20 are newly added in order that the applicants can more fully claim the subject matter of their invention. No new matter has been introduced by the amendment.

Rejection Under 35 U.S.C. § 103(a)

Claims 1, 3, 6-7, and 13 have been rejected over Wada et al. in view of Budde et al., and further in view of Zhang. This rejection is believed overcome in view of the amendment of claims 1 and 8 together with the following remarks.

Claim 1, as amended, recites a magnetic head actuator that includes a swing arm extending in a first plain. The swing arm has a magnetic head and is reciprocally movable around a coarse rotation axis at a base of the swing arm. The swing arm has an opening therein that is defined by edges extending a second plain substantially perpendicular to the first plain. A piezoelectric element having opposed edges is suspended within the opening such that the opposed edges are parallel to the edges of the opening. A non-shrinkable adhesive contacts the opposed edges of the piezoelectric element and the corresponding edges of the opening. The magnetic head actuator also includes an FPC board having a resin base and a feeding line embedded in the resin base. A portion of the resin base is removed to expose a portion of the feeding line and a direct physical connection is formed between the feeding line and the voltage impressing electrode of the piezoelectric element.

The applicants respectfully assert that the claimed magnetic head actuator is not suggested or disclosed by the cited references taken alone or in combination. In particular, it is noted that none of the cited references suggest or disclose a magnetic head actuator having a piezoelectric element suspended within an opening of the swing arm by a non-shrinkable adhesive, as claimed. While Budde et al. disclose the positioning of piezoelectric elements (32a and 32b) over openings in a swing arm, Budde et al. do not suggest or disclose suspending the piezoelectric elements within an opening of the swing arm.

The particular configuration claimed by the applicants advantageously positions the piezoelectric element within the opening in order that a flat surface is presented upon which the FPC board can reside. As illustrated by the applicants in FIG. 2 of their drawing, the FPC board 30 overlies the upper surface of at least one piezoelectric element 22. The applicants respectfully assert that the claimed structural arrangement offers advantages that cannot be obtained through the combined teachings of the cited references. Accordingly, claim 1 recites a patentably distinct magnetic head actuator.

Claims 3 and 6-7 are believed to distinguish over the cited references in view of the amendment and remarks pertaining to claim 1 from which they depend.

Claim 8, as amended, recites a magnetic head actuator having a swing arm configured with an opening. A piezoelectric element is suspended within the opening by a non-shrinkable adhesive that contacts opposed edges of the piezoelectric element and corresponding edges of the opening. The magnetic head actuator also includes an FPC board having a feeding line residing completely within the FPC board except for an exposed portion extending onto a voltage impressing electrode of the piezoelectric element. The exposed portion is bonded to the piezoelectric element by a direct physical connection between the voltage-impressing electrode and the exposed portion of the feeding line.

The applicants respectfully assert that claim 8 distinguishes over the cited references for substantially the same reasons as set forth above pertaining to claim 1. The applicants' remarks pertaining to claim 1 are incorporated by reference herein.

Claim 13 depends from claim 8 and is believed to distinguish over the cited combination of references in view of the amendment and remarks pertaining to claim 8.

At page 4 of the instant office action, it is asserted that one of ordinary skill in the art would be motivated to modify Wada et al. to suspend the piezoelectric element between two sections of the swing arm by an adhesive. The applicants respectfully disagree that Budde et al. teach suspending the piezoelectric elements within the opening as claimed by the applicants. In contrast to the assertion in the instant Office Action, Budde et al. teach the placement of piezoelectric elements over openings in the swing arm, rather than positioning the piezoelectric elements within the opening.

Further, even if Budde et al. did somehow teach suspending piezoelectric elements within an opening of the swing arm, the applicants respectfully assert that the device taught by Wada et al. would still substantially differ from the swing arm described by Budde et al. to the extent that one skilled in the art would not be motivated to combine the teachings of Wada et al. with Budde et al. For example, in the device taught by Wada et al., the actuator (11) is directly attached to the magnetic head slider (12) and it is the head itself that is moved by the actuator rather than a portion of the swing arm. Accordingly, there is no suggestion for a combination of the teachings of Wada et al. with Budde et al.

Claims 8, 10, and 14 have been rejected over Wada et al. in view of Zhang. This rejection is believed overcome in view of the amendment of claim 8 together with the following remarks.

As described above, claim 8 distinguishes over Wada et al. and Zhang. The applicants foregoing remarks pertaining to claim 8 are incorporated by reference herein.

Claims 10 and 14 are believed allowable in view of the amendment and remarks pertaining to claim 8 from which they depend.

Claims 11 and 12 have been rejected over Wada et al. and Zhang, and further in view of Pattanaik. This rejection is believed overcome in view of the amendment of claim 8 together with the following remarks.

Claim 8 is believed to distinguish over the cited references in view of their failure to suggest or disclose a magnetic head actuator having the structural features recited in claim 8. The applicants foregoing remarks pertaining to claim 8 are incorporated by reference herein. The addition of Pattanaik does not overcome the deficiencies of Wada et al. and Zhang. The applicants respectfully assert that the cited references do not suggest or disclose a magnetic head actuator having piezoelectric elements suspended within an opening in a swing arm by a non-shrinkable adhesive.

Claims 2 and 9 have been rejected over Wada et al. and Zhang, and further in view of Hayden. This rejection is believed overcome in view of the amendment of claims 1 and 8 and the following remarks.

Claim 2 is believed allowable over the cited combination of references in view of the amendment of claim 1 from which it depends. The applicants' foregoing remarks pertaining to claim 1 are incorporated by reference herein.

Claim 9 depends from claim 8 and is believed allowable in view of the amendment and remarks pertaining to claim 8. The applicants' foregoing remarks pertaining to claim 8 are incorporated by reference herein.

The applicants respectfully assert that Hayden does not overcome the deficiency of Wada et al. and Zhang. None of the cited references suggest or disclose a magnetic head actuator having the features recited in claims 1 and 8.

Claims 4 and 5 have been rejected over Wada et al., Budde et al., Zhang, and further in view of Pattanaik. This rejection is believed overcome in view of the amendment of claim 1 together with the following remarks.

The applicants' foregoing remarks pertaining to claim 1 are incorporated by reference herein. The applicants respectfully assert that Pattanaik does not overcome the deficiencies of Wada et al. and Zhang. This is at least because the combination of cited references does not suggest or disclose a magnetic head actuator having the features recited in claim 1. Claims 4 and 5 each depend from claim 1 and add further limitations to claim 1. According, these claims are believed to distinguish over the cited combination of references.

New Claims

Claims 15-20 are newly added to the application. Claim 15 recites a magnetic head actuator that includes a swing arm extending in a first plain and having a magnetic head at a free end. A flexible section connects the free end with the base end and includes outwardly extending bends. First and second openings in the flexible section are defined by edges extending in a second plain that is substantially perpendicular to the first plain. First and second piezoelectric elements are suspended in the first and second openings such that opposing edges of each piezoelectric elements are parallel with edges of the opening. A non-shrinkable adhesive contacts the opposed edges of the first and second piezoelectric elements and the corresponding edges of the first and second openings. The piezoelectric elements include voltage impressing electrodes on a first face that allows for fine arcuate movement of the free end around the coarse

rotation axis. The first and second piezoelectric elements have a ground electrode on a face opposite from the voltage impressing electrode. The magnetic head actuator also includes a FPC board, having a resin base and a feeding embedded in the resin base. A direct physical connection is made between an exposed portion of the feeding line and the voltage impressing electrode. The applicants describe the claimed magnetic head actuator, for example, in pages 7-10 of their specification and corresponding figures 1-3.

Claim 16 depends from claim 15 and recites that the actuator is configured such that about a one micrometer contraction of the first or second piezoelectric elements creates about a ten micrometer arcuate movement about the coarse axis. Support for claim 16 can be found, for example, on page 8, lines 10-19 of the applicants' specification.

Claim 17 depends from claim 15 and recites a magnetic head actuator in which the FPC board is mounted to a surface of the swing arm and spans at least one of the first and second openings in the swing arm. This feature is illustrated by the applicants, for example, in FIGs. 2 and 4 of their drawing.

Claim 18 depends from claim 1 and recites a magnetic head actuator in which the FPC board is mounted to a surface of the swing arm and spans the opening in the swing arm. Claim 18 further recites that the piezoelectric element is disposed in the opening, such that the element does not protrude above the surface of the swing arm. These features are illustrated by the applicants, for example, in FIGs. 2, 3, and 4 of their drawing.

Claim 19 depends from claim 8 and recites a magnetic head actuator in which the FPC board is mounted to a surface of the swing arm and spans the opening in the swing arm. Claim 19 further recites that the piezoelectric element is disposed in the opening, such that the element does not protrude above the surface of the swing arm. These features are illustrated by the applicants, for example, in FIGs. 2, 3, and 4 of their drawing.

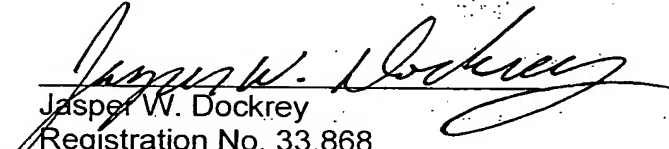
Claim 20 is a new independent claim and recites a magnetic head actuator having a swing arm with a magnetic head at a free end. The swing arm is reciprocally movable around a coarse rotation axis at a base end of the swing arm. A piezoelectric

element is suspended within an opening of the swing arm. The piezoelectric element includes a voltage-impressing electrode. An FPC board is mounted to a surface of the swing arm and spans the opening. The FPC board includes a feeding line embedded in a resin base, where a portion of the resin base is removed to expose a portion of the feeding line. The piezoelectric element is disposed in the opening, such that the piezoelectric element does not protrude above the surface of the swing arm. A direct physical connection is made between the feeding line and the voltage-impressing electrode at the exposed portion of the feeding line. The features of the magnetic head actuator recited in claim 20 are described by the applicants, for example, in pages 7-11 of their specification and FIGs. 1-3 of their drawings.

The applicants respectfully assert that claim 15-20 distinguish over the cited references and are in condition for allowance. In particular, none of the cited references suggest or disclose the claimed structural features of a magnetic head actuator that includes a piezoelectric element suspended within an opening and an FPC board spanning the opening. The claimed magnetic head actuator enables an FPC board to be fixed to the swing arm without bending or otherwise applying stress to the FPC board. Accordingly, the claimed magnetic head actuator provides an improvement over prior art devices that is not obtainable through a combination of the prior art devices. The applicants respectfully assert that the cited references do not render claims 1, 8, 15, and 20 obvious at least because one or more claim limitations are missing in the combination of cited references. Accordingly, a *prima facie* case of obviousness has not been established. The applicants' dependent claims cannot be obvious in view of the cited references because the dependent claims narrow the scope of independent claims 1, 8, and 15. The applicants respectfully assert that the same references cannot render dependent claims obvious that fail to establish the obviousness of the independent claims.

The applicants have made a novel and non-obvious contribution to the art of magnetic head actuator technology. The claims at issue are believed to distinguish over the cited references and to be in condition for allowance. Accordingly, such allowance is now earnestly requested.

Respectfully submitted,


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